

ABSTRACT OF THE DISCLOSURE

A method of manufacturing a semiconductor device is disclosed wherein a tungsten single atomic layer is deposited in a contact or via hole of a silicon substrate. A tungsten nitride (WN) layer is formed by plasma processing the tungsten single atomic layer using an atomic layer deposition process, which is repeated to form the tungsten nitride layer having a desired thickness as the barrier metal. A tungsten layer is then deposited on the semiconductor substrate to fill the contact hole. The tungsten nitride layer and the tungsten layer are in-situ deposited in a same reaction chamber for tungsten process. Accordingly, the step coverage of the tungsten nitride layer, is improved, thus reducing the contact defects of the fine contact hole, which has a high aspect ratio.